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∴ The total distance traveled by A is 144.69828+ miles, and by B, 86.81897+ miles.

This problem was also solved by *F. R. HONEY*, *C. A. JONES*, and *E. W. MORRELL*.

Solutions of problem 80 were received from G. B. M. Zerr, P. S. Berg, E. W. Morrell, F. R. Honey, and H. C. Wilkes.

NOTE. Hon. Josiah H. Drummond says, in reference to problem 78: "How can you make $986\times3+569=3905$? The question is erroneously enunciated or erroneously solved, or both."

If we assume that the problem is correctly stated, then certainly the published solution is not the solution of the problem. The following is an algebraic statement of the problem as proposed:

Let x=number of cows. Then $3x+569$=number of horses. Let y=number of sheep. Then $4y-126$= number of cows. Hence, $x=4y-126$, $3x=12y-378$, and $3x+569=12y-378+569=12y+191$, the number of horses expressed in terms of the number of sheep. Hence, y, the number of sheep, $+4y-126$, the number cows, $+12y+191$, the number of horses, or $17y+65$=total number=5169. Solving this equation, we do not obtain integral results. If 9 were changed to 5, then y would be integral, and the problem possible. We failed to find this problem in Brooks' Higher Arithmetic. EDITOR.

ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

72. Proposed by CHAS. C. CROSS, Laytonsville, Md.

Prove that $\dfrac{2\sqrt{2+\sqrt{3}}}{4+\sqrt{6}-\sqrt{2}}=\sqrt{6}-\sqrt{2}+\sqrt{3}-2$, when reduced to its lowest terms.

I. Solution by JOSIAH H. DRUMMOND, Portland, Maine.

$$\frac{2\sqrt{2+\sqrt{3}}}{4+\sqrt{6}-\sqrt{2}}=\frac{\sqrt{2\sqrt{4+2\sqrt{3}}}}{4+\sqrt{2}(\sqrt{3}-1)},\ =\frac{1+\sqrt{3}}{2\sqrt{2}+\sqrt{3}-1},$$

$$=\frac{(1+\sqrt{3})(2\sqrt{2}-\sqrt{3}+1)}{2(2+\sqrt{3})},\ =\frac{(2-\sqrt{3})(1+\sqrt{3})(2\sqrt{2}-\sqrt{3}+1)}{2},$$

$$=\frac{(\sqrt{3}-1)(2\sqrt{2}-\sqrt{3}+1)}{2},\ =\sqrt{6}-\sqrt{2}+\sqrt{3}-2.$$

II. Solution by G. B. M. ZERR, A. M., Ph. D., Russell College, Lebanon, Va.; and P. S. BERG, Principal of Schools, Larimore, N. D.

$$\frac{2\sqrt{2+\sqrt{3}}}{4+\sqrt{6}-\sqrt{2}}=\frac{\sqrt{6}+\sqrt{2}}{4+\sqrt{6}-\sqrt{2}},\ =\frac{(\sqrt{6}+\sqrt{2})(4+\sqrt{6}+\sqrt{2})}{(4+\sqrt{6})^2-2},$$

$$=\frac{\sqrt{6}+\sqrt{3}+\sqrt{2}+2}{5+2\sqrt{6}},\ =\frac{(\sqrt{6}+\sqrt{3}+\sqrt{2}+2)(5-2\sqrt{6})}{25-24},$$

$$=\sqrt{6}-\sqrt{2}+\sqrt{3}-2.$$

Also solved by *COOPER D. SCHMITT* and the *PROPOSER*.

73. Proposed by G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics, Russell College, Lebanon, Va.

Find the worth of each of five persons, A, B, C, D, and E, knowing, 1st, that when A's worth is added to a times what B, C, D, and E are worth, it is equal to m; 2nd, when B's worth is added to b times what A, C, D, and E are worth, it is equal to n; 3rd, when C's worth is added to c times what A, B, D, and E are worth, it is equal to p; 4th, when D's worth is added to d times what A, B, C, and E are worth, it is equal to q; 5th, when E's worth is added to e times what A, B, C, and D are worth, it is equal to r.

I. Solution by the PROPOSER.

Let x, y, z, u, v be the worth of A, B, C, D, and E, respectively. Then

$$\begin{aligned}&x+a(y+z+u+v)=m,\\&y+b(x+z+u+v)=n,\\&z+c(r+y+u+v)=p,\\&u+d(x+y+z+v)=q,\\&v+e(x+y+z+u)=r.\end{aligned}$$

Let $x+y+z+u+v=s$; then $x+a(s-x)=m$.

$\therefore\ x=(m-as)/(1-a)$..........(1). Similarly, $y=(n-bs)/(1-b)$........(2),

$z=(p-cs)/(1-c)$................(3), $u=(q-ds)/(1-d)$................(4),

$v=(r-cs)/(1-e)$................(5).

Adding (1), (2), (3), (4), and (5), we get

$$s=\frac{m-as}{1-a}+\frac{n-bs}{1-b}+\frac{p-cs}{1-c}+\frac{q-ds}{1-d}+\frac{r-es}{1-e}.$$

$$\therefore\ s=\frac{\left\{\dfrac{m}{1-a}+\dfrac{n}{1-b}+\dfrac{p}{1-c}+\dfrac{q}{1-d}+\dfrac{r}{1-e}\right\}}{\left\{1+\dfrac{a}{1-a}+\dfrac{b}{1-b}+\dfrac{c}{1-c}+\dfrac{d}{1-d}+\dfrac{e}{1-e}\right\}}.$$

This value of s in (1), (2), (3), (4), (5) gives x, y, z, u, v.